

FAQ: Rechargeable Pro Thermal Imager TI290



Q: Where can I find product specifications and information to help me use my TI290?

A: Refer to the TI290 Instruction Manual for detailed product specifications.

Q: Which mobile devices are compatible for use with the Klein Tools TI290 Thermal Imager?

A: The TI290 Thermal Imager is compatible with devices using Android® 7 or iOS 11 and higher.

Q: What is Emissivity:

A: Emissivity is a property which measures an object's ability to emit or radiate thermal energy based on its material and the nature of its surface. Most organic, painted, or oxidized surfaces have emissivity values close to 0.95 (default). For specific details on the emissivity for various objects to use with your TI290, please review the Klein Tools Emissivity Settings Chart for Non-Metal and Metal Materials.

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EMISSIVITY CHART FOR NON-METAL MATERIALS

Temp F° (C°)	Emissivity	Temp F° (C°)	Emissivity	Temp F° (C°)	Emissivity	Temp F° (C°)	Emissivity		
Adobe		Cotton Cloth		Paints		Silica, Glazed			
68 (20)	0.9	68 (20)	0.77	Blue, Cu2O3	75 (24)	0.94	1832 (1000)	0.85	
Asbestos		Dolomite Lime		Black, CuO	75 (24)	0.96	Silica, Unglazed		
Board	100 (38)	68 (20)	0.41	Green, Cu2O3	75 (24)	0.92	2012 (1100)	0.75	
Cement	32-392 (0-200)	Emery Corundum		Red, Fe2O3	75 (24)	0.91	Silicon Carbide		
Cement, Red	2500 (1371)	176 (80)	0.86	White, Al2O3	75 (24)	0.94	300-1200	83-96	
Cement, White	2500 (1371)	Glass		White, Y2O3	75 (24)	0.9	(149-649)		
Cloth	199 (93)	Convex D	212 (100)	White, ZnO	75 (24)	0.95	Silk Cloth		
Paper	100-700 (38-371)	Convex D	600 (316)	White, MgCO3	75 (24)	0.91	68 (20)	0.78	
Slate	68 (20)	Convex D	932 (500)	White, ZrO2	75 (24)	0.95	Slate		
Asphalt, pavement	100 (38)	NoneX	212 (100)	White, ThO2	75 (24)	0.9	100 (38)	.67-80	
Asphalt, tar paper	68 (20)	NoneX	600 (316)	White, MgO	75 (24)	0.91	Snow, Fine Particles		
Basalt		NoneX	932 (500)	White, PbCO3	75 (24)	0.93	20 (-7)	0.82	
68 (20)	0.72	Smooth	32-200 (0-93)	Yellow, PbO	75 (24)	0.9	Snow, Granular		
Brick		Granite	70 (21)	Yellow, PbCrO4	75 (24)	0.93	18 (-8)	0.89	
Red, rough	70 (21)	Gravel		Paints, Aluminium					
Gault Cream	2500-5000 (1371-2760)	100 (38)	0.28	100 (38)	.27-.67	Soil			
Fire Clay	2500 (1371)	Gypsum		26% Al	100 (38)	0.3	Surface	100 (38)	
Light Buff	1000 (538)	68 (20)	.80-.90	26% Al	100 (38)	0.3	Black Loam	68 (20)	
Lime Clay	2500 (1371)	Ice, Smooth		Dow XP-310	200 (93)	0.22	Plowed Field	68 (20)	
Fire Brick	1832 (1000)	32 (0)	0.97	Paints, Bronze					
Magnesite, Refractory	1832 (1000)	Ice, Rough		Low	.34-.80	Soot			
Grey Brick	2012 (1100)	32 (0)	0.98	Gum Varnish (2 coats)	70 (21)	0.53	Acetylene	75 (24)	
Silica, Glazed	2000 (1093)	Lacquer		Gum Varnish (3 coats)	70 (21)	0.5	Camphor	75 (24)	
Silica, Unglazed	2000 (1093)	Black	200 (93)	Cellulose Binder (2 coats)	70 (21)	0.34	Candle	250 (121)	
Sandlime	2500-5000 (1371-2760)	Blue, on Al Foil	100 (38)	Paints, Oil				Coal	68 (20)
Carborundum		Clear, on Al Foil (2 coats)	200 (93)	All colours	200 (93)	.92-.96	Stonework		
1850 (1010)	0.92	Clear, on Bright Cu	200 (93)	Black	200 (93)	0.92	100 (38)	0.93	
Ceramic		Clear, on Tarnished Cu	200 (93)	Black Gloss	70 (21)	0.9	Water		
Alumina on Inconel	800-2000 (427-1093)	Red, on Al Foil (2 coats)	100 (38)	Camouflage Green	125 (52)	0.85	100 (38)	0.67	
Earthenware, Glazed	70 (21)	White	200 (93)	Flat Black	80 (27)	0.88	Waterglass		
Earthenware, Matte	70 (21)	White, on Al Foil (2 coats)	100 (38)	Flat White	80 (27)	0.91	68 (20)	0.96	
Greens No. 5210-2C	200-750 (93-399)	Yellow, on Al Foil (2 coats)	100 (38)	Grey-Green	70 (21)	0.95	Wood		
Coating No. C20A	200-750 (93-399)	Lime Mortar	100-500 (38-260)	Green	200 (93)	0.95	Low	.80-.90	
Porcelain	72 (22)	Limestone	100 (38)	Lamp Black	209 (98)	0.96	Beech Planed		
White Al2O3	200 (93)	Marble, White	Smooth, White	Red	200 (93)	0.95	158 (70)	0.94	
Zirconia on Inconel	800-2000 (427-1093)	Polished Grey	100 (38)	White	200 (93)	0.94	Oak, Planed		
Clay		Mica	100 (38)	Quartz, Rough, Fused				100 (38)	0.91
68 (20)	0.39	Oil on Nickel	0.001" Film	70 (21)	0.93	Red Lead			
Fired	158 (70)	0.002" Film	72 (22)	Glass, 1.98 mm	540 (282)	0.9	Rubber, Hard		
Shale	68 (20)	0.005" Film	72 (22)	Glass, 1.98 mm	1540 (838)	0.41	Rubber, Soft, Grey		
Tiles, Light Red	2500-5000 (1371-2760)	Thick" Film	72 (22)	Glass, 6.88 mm	540 (282)	0.93	74 (23)	0.94	
Tiles, Red	2500-5000 (1371-2760)	Oil, Linseed	On Al Foil, uncoated	Glass, 6.88 mm	1540 (838)	0.47	Rubber, Soft, Grey		
Tiles, Dark Purple	2500-5000 (1371-2760)	On Al Foil, 1 coat	250 (121)	Opaque	570 (299)	0.92	76 (24)	0.86	
Concrete		On Al Foil, 2 coats	250 (121)	Opaque	1540 (838)	0.68	Sand		
Rough	32-2000 (0-1093)	On Polished Iron, .001 Film	100 (38)	Red Lead				68 (20)	
Tiles, Natural	2500-5000 (1371-2760)	On Polished Iron, .002 Film	100 (38)	212 (100)	0.93	Sandstone			
Brown	2500-5000 (1371-2760)	On Polished Iron, .004 Film	100 (38)	Rubber, Hard				100 (38)	
Black	2500-5000 (1371-2760)	On Polished Iron, Thick Film	100 (38)	74 (23)	0.94	Sandstone, Red			
				Rubber, Soft, Grey				100 (38)	
				Sand				68 (20)	
				Sandstone				100 (38)	
				Sandstone, Red				100 (38)	
				Sawdust				68 (20)	
				Shale				68 (20)	
								0.69	

EMISSIVITY CHART FOR METAL MATERIALS

Temp F° (C°)	Emissivity	Temp F° (C°)	Emissivity	Temp F° (C°)	Emissivity	
Alloys		Chromium		Cast Iron		
20-Ni, 24-CR, 55-FE, Oxid.	392 (200)	100 (38)	0.08	Oxidised	390 (199)	0.64
20-Ni, 24-CR, 55-FE, Oxid.	932 (500)	1000 (538)	0.26	Oxidised	1110 (599)	0.78
60-Ni, 12-CR, 28-FE, Oxid.	518 (270)	Chromium, Polished		Unoxidised	212 (100)	0.21
60-Ni, 12-CR, 28-FE, Oxid.	1040 (560)	302 (150)	0.06	Strong Oxidation	40 (104)	0.95
80-Ni, 20-CR, Oxidised	212 (100)	Cobalt, Unoxidised		Strong Oxidation	482 (250)	0.95
80-Ni, 20-CR, Oxidised	1112 (600)	932 (500)	0.13	Liquid	2795 (1535)	0.29
80-Ni, 20-CR, Oxidised	2372 (1300)	1832 (1000)	0.23	Wrought Iron		
Aluminium		Columbium, Unoxidised		Dull	77 (25)	0.94
Unoxidised	77 (25)	1500 (816)	0.19	Dull	660 (349)	0.94
Unoxidised	212 (100)	2000 (1093)	0.24	Smooth	100 (38)	0.35
Unoxidised	932 (500)	Copper		Polished	100 (38)	0.28
Oxidised	390 (199)	Cuprous Oxide	100 (38)	Lead		
Oxidised	1110 (599)	Cuprous Oxide	500 (260)	Polished	100-500 (38-260)	.06-.08
Oxidised at 1110°F (599°C)	390 (199)	Cuprous Oxide	1000 (538)	Rough	100 (38)	0.43
Oxidised at 1110°F (599°C)	1110 (599)	Black, Oxidised	100 (38)	Oxidised	100 (38)	0.43
Heavily Oxidised	200 (93)	Etched	100 (38)	Oxidised at 1100	100 (38)	0.63
Heavily Oxidised	940 (504)	Matte	100 (38)	Gray Oxidised	100 (38)	0.28
Highly Polished	212 (100)	Roughly Polished	100 (38)	Magnesium		
Roughly Polished	212 (100)	Polished	100 (38)	100-500 (38-260)	.07-.13	
Commercial Sheet	212 (100)	Highly Polished	100 (38)	Magnesium Oxide		
Highly Polished Plate	440 (227)	Rolled	100 (38)	1880-3140 (1027-1727)	.16-.20	
Highly Polished Plate	1070 (577)	Rough	100 (38)	Mercury		
Bright Rolled Plate	338 (170)	Molten	1000 (538)	32 (0)	0.09	
Bright Rolled Plate	932 (500)	Molten	1970 (1077)	77 (25)	0.1	
Alloy A3003, Oxidised	600 (316)	Molten	2230 (1221)	100 (38)	0.1	
Alloy A3003, Oxidised	900 (482)	Nickel Plated	100-500 (38-260)	212 (100)	0.12	
Alloy 1100-0	200-800 (93-427)	Dow Metal		Molybdenum		
Alloy 24ST	75 (24)	0.4-600 (-18-316)	0.15	100 (38)	0.06	
Alloy 24ST, Polished	75 (24)	Gold		500 (260)	0.08	
Alloy 75ST	75 (24)	Enamel	212 (100)	1000 (538)	0.11	
Alloy 75ST, Polished	75 (24)	Plate on .0005 Silver	200-750 (93-399)	2000 (1093)	0.18	
Bismuth, Bright		Plate on .0005 Nickel	200-750 (93-399)	Monel, Ni-Cu		
176 (80)	0.34	Polished	100-500 (38-260)	392 (200)	0.41	
Bismuth, Unoxidised		Polished	1000-2000 (538-1093)	752 (400)	0.44	
77 (25)	0.05	Haynes Alloy C,		1112 (600)	0.46	
212 (100)	0.06	Oxidised	600-2000 (316-1093)	Monel, Ni-Cu Oxidised		
Brass		Oxidised	600-2000 (316-1093)	68 (20)	0.43	
73% Cu, 27% Zn, Polished	476 (247)	Haynes Alloy 25,		Monel, Ni-Cu Oxid. at 1110degF		
73% Cu, 27% Zn, Polished	674 (357)	Oxidised	600-2000 (316-1093)	1110 (599)	0.46	
62% Cu, 37% Zn, Polished	494 (257)	Haynes Alloy X,		Nickel		
62% Cu, 37% Zn, Polished	710 (377)	Oxidised	600-2000 (316-1093)	Polished	100 (38)	
83% Cu, 17% Zn, Polished	530 (277)	Inconel Sheet		Oxidised	100-500 (38-260)	
Matte	68 (20)	Unoxidised	1000 (538)	Unoxidised	212 (100)	
Burnished to Brown Colour	68 (20)	Unoxidised	1200 (649)	Unoxidised	932 (500)	
Cu-Zn, Brass Oxidised	392 (200)	Unoxidised	1400 (760)	Unoxidised	1832 (1000)	
Cu-Zn, Brass Oxidised	752 (400)	Inconel X, Polished	75 (24)	Electrolytic	100 (38)	
Cu-Zn, Brass Oxidised	1112 (600)	Unoxidised	75 (24)	Electrolytic	500 (260)	
Unoxidised	77 (25)	Inconel B, Polished	75 (24)	Electrolytic	1000 (538)	
Unoxidised	212 (100)	Iron	75 (24)	Electrolytic	2000 (1093)	
Cadmium	77 (25)	Oxidised	212 (100)	Nickel Oxide	1000-2000 (538-1093)	
Carbon		Oxidised	930 (499)	1000-2000 (538-1093)	.59-.86	
Lampblack	77 (25)	Oxidised	2190 (1199)	Palladium Plate (.00005 on .0005 silver)		
Unoxidised	77 (25)	Unoxidised	212 (100)	200-750 (93-399)	.16-.17	
Unoxidised	212 (100)	Red Rust	77 (25)	Platinum		
Unoxidised	932 (500)	Rusted	77 (25)	100 (38)	0.05	
Candle Soot	250 (121)	Liquid	2760-3220 (1516-1771)	500 (260)	0.05	
Filament	500 (260)			1000 (538)	0.1	
Graphitized	212 (100)					
Graphitized	572 (300)					
Graphitized	932 (500)					

EMISSIVITY CHART FOR METAL MATERIALS

Temp F° (C°)	Emissivity	Temp F° (C°)	Emissivity
Platinum, Black		Stellite, Polished	
500 (260)	0.93	68 (20)	0.18
1000 (538)	0.96	Tantalum, Unoxidised	
2000 (1093)	0.97	1340 (727)	0.14
Platinum Oxidised at 1100		2000 (1093)	0.19
500 (260)	0.07	3600 (1982)	0.26
1000 (538)	0.11	5306 (2930)	0.3
Rhodium Flash (0.0002 on 0.0005 Ni)		Tin, Unoxidised	
200-700 (93-371)	.10-.18	77 (25)	0.04
Silver		212 (100)	0.05
Plate (0.0005 on Ni)	200-700 (93-371)	Tinned Iron, Bright	
Polished	100 (38)	76 (24)	0.05
Polished	500 (260)	212 (100)	0.08
Polished	1000 (538)	Titanium	
Polished	2000 (1093)	Alloy C110M, Polished	300-1200 (149-649)
Steel		Oxidised at 1000°F (538°C)	200-800 (93-427)
Cold Rolled	200 (93)	Alloy Ti-95A, Oxidised at 1000°F (538°C)	200-800 (93-427)
Ground Sheet	1720-2010 (938-1099)	Anodized onto SS	200-600 (93-316)
Polished Sheet	100 (38)	Tungsten	
Polished Sheet	500 (260)	Unoxidised	77 (25)
Polished Sheet	1000 (538)	Unoxidised	212 (100)
Mild Steel, Polished	75 (24)	Unoxidised	932 (500)
Mild Steel, Smooth	75 (24)	Unoxidised	1832 (1000)
Mild Steel, liquid	2910-		